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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/670,917	09/29/2000	Norikazu Mizuno	81877.0007	1895

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EXAMINER

GUERRERO, MARIA F

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 07/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/670,917

Applicant(s)

MIZUNO ET AL.

Examiner

Maria Guerrero

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 April 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,6-8,22-30 and 36-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-2, 6-8, 22-30 is/are rejected.
- 7) ☒ Claim(s) 36-38 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office Action is in response to the amendment filed April 27, 2005.

Status of Claims

2. Claim 3-5, 9-21, and 31-35 are canceled. Claims 1-2, 6-8, 22-30 and 36-38 are pending.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-2, 6-8, and 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carlson et al. (U.S. 5,421,957) (cited by Applicant) in view of Laxman et al. (U.S. 5,874,368).

Carlson et al. teaches forming a silicon nitride film on a reaction container, removing silicon nitride film by introducing NF_3 gas (Abstract, col. 3, lines 10-15, Table I). Carlson et al. teaches the silicon nitride film is deposited by thermal CVD (col. 4, lines 5-25, 52-55). Carlson et al. discloses after a sufficient number of deposition process a film of sufficient thickness in the range of 1 to 5 micrometers builds up and can

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contaminate the process (col. 4, lines 43-51). Carlson et al. teaches removing the silicon nitride at a pressure of 12 torr or more (col. 6, lines 3-65). Carlson et al. shows the reaction container being made of quartz (col. 4, lines 1-5).

Carlson et al. describes the etch rate of the nitride being angstroms/min and the time min; therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to determine the total silicon nitride removed employing the data provided by Carlson et al. (see Table I, Table II, col. 6, lines 1-69, col. 7-8).

Carlson et al. fails to show forming the silicon nitride film with bis tertiary butyl amino silane and NH_3 . However, Laxman et al. shows forming a silicon nitride layer with bis tertiary butyl amino silane and NH_3 by chemical vapor deposition (col. 4, lines 5-20, col. 5, lines 35-50).

The determination of the appropriated accumulated thickness on the reaction container is considered to be obvious to a person of ordinary skill in the art because it is not critical to the invention." In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990). See also MPEP § 716.02- § 716.02(g).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Carlson et al. reference by including the formation of nitride films using bis tertiary butyl amino silane as taught Laxman et al. The modification would produce a silicon nitride film having superior uniformities and would eliminate buildup of the silicon nitride layer on internal chamber parts producing less global warming gas effluents.

5. Claims 26-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carlson et al. (U.S. 5,421,957) (cited by Applicant) in view of Laxman et al. (U.S. 5,874,368) and Nagashima et al. (U.S. 5,129,958).

Carlson et al. teaches forming a silicon nitride film on a reaction container, removing silicon nitride film by introducing NF_3 gas (Abstract, col. 3, lines 10-15, Table I). Carlson et al. teaches the silicon nitride film is deposited by thermal CVD (col. 4, lines 5-25, 52-55). Carlson et al. discloses after a sufficient number of deposition process a film of sufficient thickness in the range of 1 to 5 micrometers builds up and can contaminate the process (col. 4, lines 43-51). Carlson et al. teaches removing the silicon nitride at a pressure of 12 torr or more (col. 6, lines 3-65). Carlson et al. shows the reaction container being made of quartz (col. 4, lines 1-5).

Carlson et al. describes the etch rate of the nitride being angstroms/min and the time min; therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to determine the total silicon nitride removed employing the data provided by Carlson et al. (see Table I, Table II, col. 6, lines 1-69, col. 7-8).

Carlson et al. fails to show forming the silicon nitride film with bis tertiary butyl amino silane and NH_3 . However, Laxman et al. shows forming a silicon nitride layer with bis tertiary butyl amino silane and NH_3 by chemical vapor deposition (col. 4, lines 5-20, col. 5, lines 35-50).

Carlson et al. fails to show purging the reaction container using NH_3 gas at least one of before and after of forming the silicon nitride film. However, Nagashima et al.

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shows the step of purging the reaction container using NH_3 gas (Abstract, col. 2, lines 20-60, col. 3, lines 1-20).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Carlson et al. reference by including the teaching of Laxman et al. and Nagashima et al. The modification would produce a silicon nitride film having superior uniformities and would eliminate the deleterious effects of fluorine after the cleaning process during previous to deposition (Nagashima et al., col. 1, lines 50-55, col. 2, lines 3-10).

Response to Arguments

6. Applicant's arguments filed September 27, 2004 have been fully considered but they are not persuasive. Claims 1-2, 6-8, and 22-30 stand rejected.

7. Applicant argued that Carlson et al. is silent about films lower than 10,000 angstroms. However, Carlson et al. shows several tests removing silicon nitride of less than 4,000 angstroms (see Table I, Table II, col. 6, lines 1-69, col. 7-8).

In addition, the rejection is maintained because applicant has failed to show that the thickness of 4,000 angstroms is critical to the invention. The results showed by Applicant in Figure 7 disclosed cleaning being performed when the thickness of silicon nitride reaches 3,000 angstroms and the claim recites: "before said silicon nitride formed in said reaction container reaches a thickness of 4,000 angstroms". Therefore, the thickness of 4,000 angstroms is not critical because according to Applicant's disclosure the production of microcracks at 4,000 angstroms is conventional. In

addition, whether the unexpected results are the result of unexpectedly improved results or a property not taught by the prior art, the "objective evidence of nonobviousness must be commensurate in scope with the claims which the evidence is offered to support." In other words, the showing of unexpected results must be reviewed to see if the results occur over the entire claimed range. In re Clemens, 622 F.2d 1029, 1036, 206 USPQ 289, 296 (CCPA 1980). See also In re Peterson, 315 F.3d 1325, 1329-31, 65 USPQ2d 1379, 1382-85 (Fed. Cir. 2003). In re Grasselli, 713 F.2d 731, 741, 218 USPQ 769, 777 (Fed. Cir. 1983). See MPEP § 716.02(d) [R-2]. The applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990). See MPEP § 716.02 - § 716.02(g).

Furthermore, while the claims of issued patents are interpreted in light of the specification, prosecution history, prior art and other claims, this is not the mode of claim interpretation to be applied during examination. During examination, the claims must be interpreted as broadly as their terms reasonably allow. > In re American Academy of Science Tech Center, F.3d, 2004 WL 1067528 (Fed. Cir. May 13, 2004)(The USPTO uses a different standard for construing claims than that used by district courts; during examination the USPTO must give claims their broadest reasonable interpretation.) < This means that the words of the claim must be given their plain meaning unless applicant has provided a clear definition in the specification. In re Zletz, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) **>; Chef America,

Inc. v. Lamb-Weston, Inc., 358 F.3d 1371, 1372, 69 USPQ2d 1857 (Fed. Cir. 2004).
See MPEP § 2111.01 [R-2].

Allowable Subject Matter

8. Claims 36-38 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the results showed by Applicant in Figure 7 disclosed cleaning being performed when the thickness of silicon nitride reaches 3,000 angstroms in order to form particle-free silicon nitride films 100 times continuously in a maintenance-free manner (page 14). Therefore, 3,000 angstroms is considered to be critical.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 571-272-1837.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

July 7, 2005

Maria Guerrero
MARIA F. GUERRERO
PRIMARY EXAMINER